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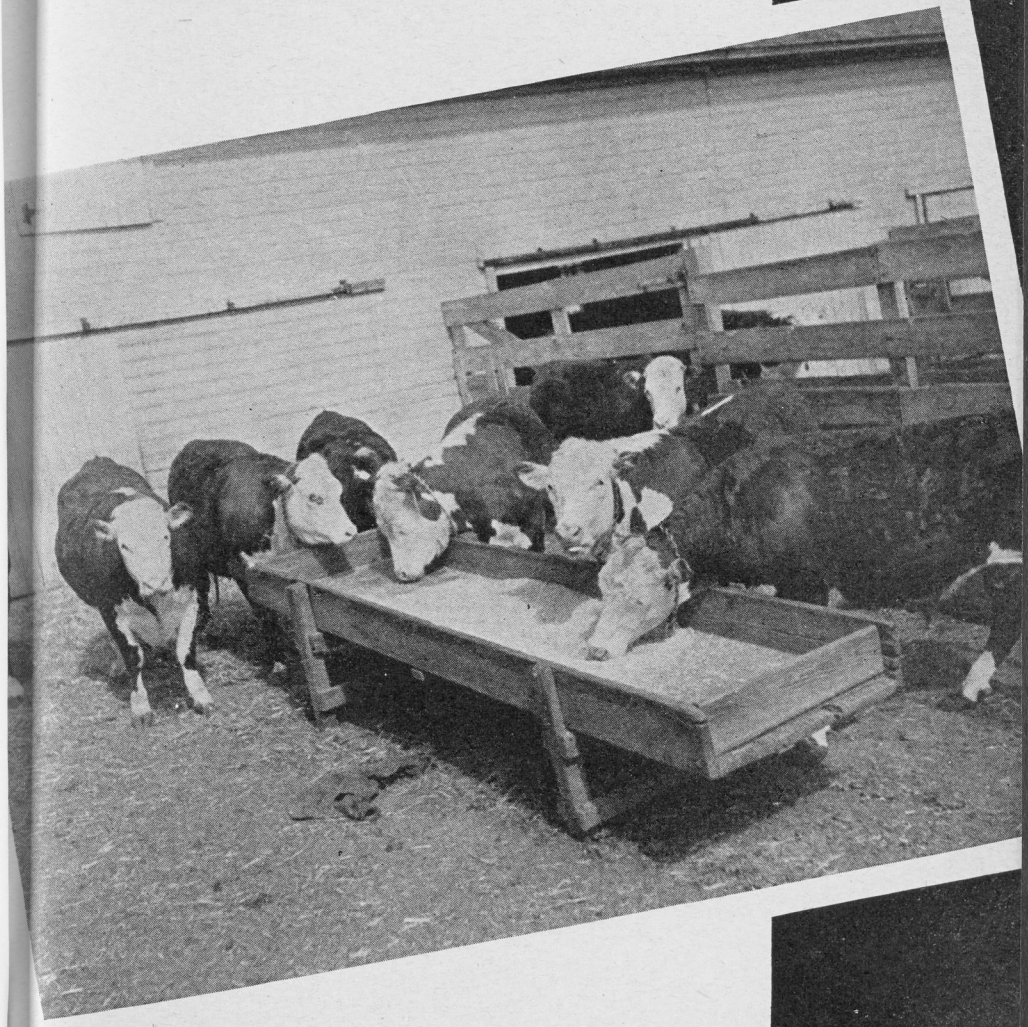
Experience of Some Iowa Farmers With CATTLE FEEDING



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SUMMARY

To plan his operations for maximum returns, a cattle feeder must know (1) effects of different feeding practices on costs of gains, (2) how rates of gains and costs vary among different types of cattle, (3) how sales prices vary with the degree of finish and (4) how prices of various grades change from season to season.

Margins between feeder and fat cattle have a definite seasonal variation, and the available margin varies between different lengths of feeding period. For instance, Good to Choice feeders sold 9 months later as Good steers may yield margins of anywhere from an average of $1.40 per hundred pounds, if the cattle were bought in May, to $2.50 if bought in December.

Costs of gains vary with the feeding practices. But the farmer should select his methods of feeding to suit his feed supply, available supply of labor and the outlook for cattle prices, if he is to get the greatest returns.

Cattle fed on pasture require somewhat less grain than those fed in drylot. But total feed cost per hundred pounds of gain does not appear to differ materially between the two methods. Further, the pasture-fed cattle are on hand during the summer season when their demand for labor competes with that of the crops.

The longer cattle are fed the less rapid becomes the gain and the higher the cost per hundred pounds. Steers weighing over 700 pounds when put on feed made gains at 1938-39 feed costs of $7.08 per hundred pounds when fed less than 4 months, $8.01 when fed 4 to 7 months and $8.60 when fed 7 to 10 months.

At corn and roughage prices prevailing in 1938-39 the steers that were fed rather heavily on legume roughage made the cheapest gains, followed by steers with high grain and low

roughage rations. The highest costs occurred on steers that were fed heavily on non-legume roughage.

Sixty-one lots of steers receiving relatively small amounts of protein supplement made gains that cost practically the same at prevailing prices as did gains on steers receiving more supplement. But the steers receiving more supplement sold for slightly higher prices.

Silage feeding proved relatively unprofitable, and gains on silage-fed steers cost about 50 cents per hundred pounds more than on steers receiving no silage.

Experience of Some Iowa Farmers With Cattle Feeding[1]

By John A. Hopkins and Robert B. Elwood

The cattle feeder's main purpose is to get the largest possible returns from his cattle with the amount of feed, capital and labor that he has available. Naturally, returns from the farm as a whole are more important than the success of any one enterprise, but the management of the entire farm involves many more questions than we can discuss adequately in this short bulletin. Therefore we shall simply present information obtained in 1938 and 1939 on the more common methods of Iowa cattle feeders. Results will be discussed solely on the basis of the cattle-feeding enterprise itself.

THE CATTLE FEEDER'S PROBLEMS

Cattle feeders usually have farms larger than the average. The typical Iowa farm is a quarter-section while the farms in this study averaged over 200 acres. The larger cattle feeders and farmers who feed cattle on pasture operate even larger acreages. The 17 farmers who fed more than 50 head of cattle, partly on pasture, during 1938 had farms averaging 317 acres.

Not only are the cattle-feeding farms larger than average (see appendix table 1), but they tend to be above average in production and are consequently more intensively farmed. Around 40 percent of their total land was in corn in 1937, compared with 30 percent on the average Iowa farm.

The high productivity of cattle-feeding farms is due partly to the manure from the large amounts of grain and feed purchased. Even the small feeders (averaging 26 head sold) in our study bought and fed in 1938 about 800 bushels of corn,

[1] Project 630 of the Iowa Agricultural Experiment Station.

The study is based chiefly on records on 388 lots of cattle fed on 221 farms during the 2-year period beginning in the fall of 1937. Survey schedules were obtained on 140 lots of cattle fed in Pottawattamie County, 84 lots in Crawford and Ida Counties and 71 lots fed in Cedar and Jones Counties. In addition to these there were 93 records from members of Farm Business Associations, distributed over the northern two-thirds of the state.

300 bushels of oats and over 4 tons of commercial feed in addition to their own crops.

The larger feeders, who averaged 90 head fed and sold, bought approximately 4,000 bushels of corn, 650 bushels of oats and 17 tons of commercial feed. Not all of this feed, however, was used by the cattle. Hogs are highly important. The smaller feeders sold or butchered an average of 91 hogs and the large-scale group 119 hogs.

In spite of large production on the cattle-feeding farms, the amount of labor used is not much above that of the average farm. The small-scale feeders hired about 7 months of labor during the year and the larger operators about 12 months. In addition to hired labor the farmer and members of his family put in 14 to 15 months of work during the year.

How does the cattle-feeding farm compare with other types in amount of investment in permanent improvements and equipment? A sample survey of nearly 800 farms shows that investment in permanent improvements per 100 acres of farm land is about the same on cattle-feeding farms as on other types. But the investment in equipment (including tractors, trucks and automobiles) is about a third higher. Of this difference, however, only a small part can be attributed directly to the cattle enterprise, since feed bunks, self-feeders and the like are valued at less than $100 on the average cattle-feeding farm.

Feeding practices vary widely, both between different parts of the state and between different farms in each area. These differences are due partly to the accessibility of feeder-cattle markets and of markets for the finished cattle, partly to the amounts of rough pasture land and to the supply of corn available for fattening the steers, and finally, to the preferences of the individual farmer.

In Pottawattamie County most of the cattle fed are yearlings of medium or good quality. In this county cattle are generally fed for about 6 months and in drylot. In Crawford and Ida Counties about two-thirds of the feeder cattle were Good or Choice calves and were commonly fed for 9 months to a year. Many of them were fed on pasture and then finished for the fall or winter markets. In Cedar and Jones

Counties most of the cattle on which information was obtained were about the same weight as those fed in Pottawattamie County but were often of higher quality, were fed longer and were sold around 100 pounds heavier.

WHAT INFORMATION DOES THE CATTLE FEEDER NEED?

The cattle feeder naturally hopes to make the largest possible net returns. These are likely to vary in any particular year with the type of cattle fed, the practices followed and the suitability of these practices to the available feed and equipment. Futhermore, the returns will vary with the season when the cattle are fed. This is true partly because prices of feeders and of fat cattle go through a more or less definite seasonal trend and partly because costs also differ from one season to another. Cattle bought in the early fall have the advantage of cheap feed for a few weeks on corn stalks pasture. Following this they may be fed during the winter months when there is but little competing demand for farm labor. Cattle fed during the summer require labor at times when it is seriously needed by the crops. Thus the cattle finished in the late summer or early fall may be sold on higher markets, but because of higher costs and because of interference with other types of farm work they may make no greater net returns than those sold in the spring.

If a cattle feeder is to plan his operations intelligently he needs to know (1) how the various feeding practices affect the rates and costs of gain, (2) how rates of gains and costs vary between different types of cattle, (3) how the degree of finish and the selling price of the cattle is affected by feeding practices and by various lengths of feed, (4) how prices of the various grades of cattle fluctuate from month to month during the year.

Do cattle feeders in general know these facts already? Cattle feeders are noted for being among the most alert and marketwise of farmers. Most of them are aware, at least in a general way, of the differences in results between various feeding practices. And yet, available information indicates that many feeders have only hazy ideas rather than specific knowledge about these influences.

In the first year of this study about 80 feeders were asked such questions as why they followed the methods that they did, why they bought and sold at the dates reported, how much corn they counted on using per hundred pounds of gain, and so on. Thirty-five farmers who fed all their cattle in drylot expected that it would require an average of 14.6 bushels of corn or its equivalent per hundred pounds of gain. When their cattle were sold and the feed requirement figures were added up it was found that they had actually fed an average of 13.2 bushels. Twenty farmers who were feeding all their cattle in pasture estimated their corn requirement at an average of 13.4 bushels, while they actually used an average of 12.4 bushels.

Taken as individuals, however, the errors of estimate ran very much larger. Individual estimates ran all the way from 10 bushels per 100 pounds of gain to 22.5 bushels, but about a quarter of the men either replied that they did not know, or did not answer the question. Of the 59 men who gave definite estimates of the amount of corn or its equivalent that they usually required per hundred pounds of gain, 16 estimates were within 2 bushels of the amounts actually used, 26 were in error by 2 to 4.9 bushels, and 17 were in error by 5 bushels or more.

Evidently cattle feeders need more specific information on their own feed requirements. And since these vary according to different feeding methods, they need to know specifically the feed requirements for the different methods and for the different kinds of cattle as well. Experiences with nearly 400 lots of cattle will be summarized in the latter half of this bulletin.

If the feeder is to make a profit, the best possible information about market conditions and prospects is of vital importance as well as information about feed requirements. Many farmers have had a highly successful feeding enterprise insofar as rapid gains and low feed consumption are concerned, only to meet disaster on an unfavorable market. Possibly this was unavoidable, but often closer attention to the market outlook would have saved part or all of the loss. In order to interpret the market information, the farmer

needs to be acquainted with seasonal cattle price movements and to keep on the watch for variations from the usual trends.

What reasons do farmers give for buying their cattle in their customary months? Out of 78 farmers who were questioned on this point, seasonal availability of feed was uppermost in the minds of 32. Thirty said that they bought their feeders in the fall largely because there is a wider choice of cattle then, and of this group 12 considered feed availability also. Another group of 16 said that they bought cattle in months when they expected them to be cheapest. Miscellaneous reasons were given by 32 others. (Many gave more than one reason.)

Thus, the availability of feed in the fall is the principal reason for purchase of feeders at that time. But this reason is reinforced by the simultaneous supply of western feeders at relatively low prices. To what extent does this market condition open up an economic opportunity that does not exist at other seasons of the year? We shall return to this question a little later.

After the cattle are purchased conditions of the market may change. How do the cattle feeders decide when to sell; do they stick to their previous plans or revise them as the feeding period advances? Out of 77 farmers who gave information on this question, 35 stated that their decisions when to sell were based wholly or partly on market information gained from radio reports, livestock journals, newspapers, letters from commission firms (in the order given) and from other sources. Twenty-four farmers said that they sold their cattle when they were fat or "ready" (although they may actually be sold in varying degrees of fatness). Another 16 try to sell in certain months. Eight of this latter group said that they make up their minds when they are going to sell when the cattle are put into the feedlot and then do not vary more than a few days from this decision.

Evidently many of these relatively wide-awake farmers consider only part of the known facts that actually affect their profits, and some of them apparently shut their eyes and pick a day, pretty much at random, on which to sell their cattle.

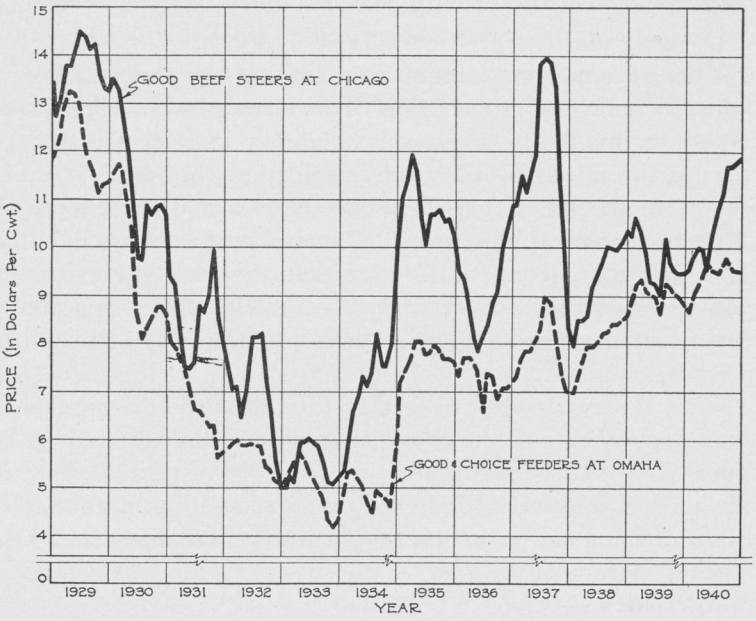

Fig. 1. Monthly fluctuations of prices of good steers and of feeder cattle, 1929-1940.

CATTLE-PRICE TRENDS AND THE FEEDING PROGRAM

Commercial cattle feeding is, notoriously, an enterprise of wide price risks. This is shown by the wide fluctuations in monthly feeder and fat cattle prices from 1929 to 1940 (fig. 1). The feeder must be prepared to meet the risks of such changes from month to month while the cattle are in his feedlot. Seasonal movements are fairly well defined and account can be taken of them. But the longer and less regular trends often referred to as "cycles" and the irregular week to week or month to month fluctuations can be guarded against only very imperfectly.

On the supply side some of these irregular movements may be caused by cattle raisers holding cattle back for breeding purposes or liquidating part of their herds. To some extent market receipts and prices may fluctuate because farmers

dump cattle on the market or hold them longer than usual in anticipation of rising or falling prices. At other times markets are affected by favorable or unfavorable weather on the ranges, or because of large or small crops of feed in the Corn Belt.

Fluctuations in demand are no less important. The demand for beef may increase or decline because of fluctuations in employment, changes in wage levels or other elements of consumer buying power, or because of changes in supply of competing foods. To minimize losses or to make satisfactory returns the cattle feeder must watch these many trends of business activity and of supply conditions.

The agricultural outlook information issued by the Agricultural Extension Service and by the U. S. Department of Agriculture provides a convenient means of keeping abreast of available information. But cattle prices are highly sensitive and the extent and timing of their movements cannot be foretold with a very high degree of accuracy even with the best of information.

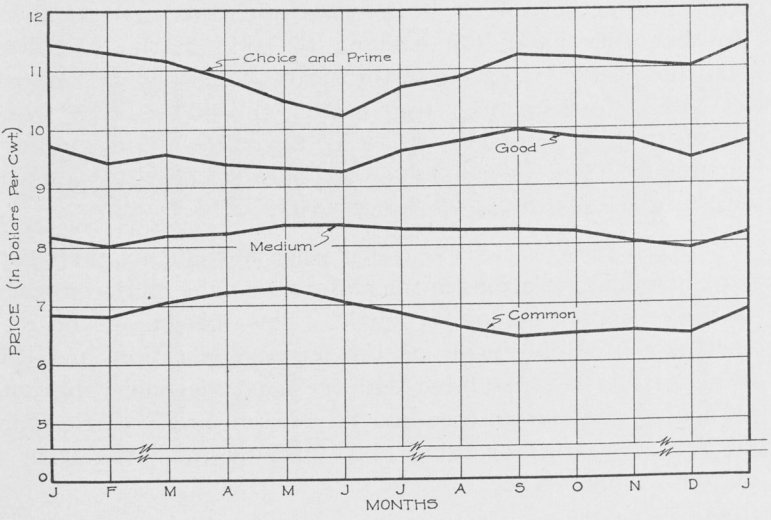

Fig. 2. Seasonal movement of prices of fat cattle at Chicago, 1929-1940.

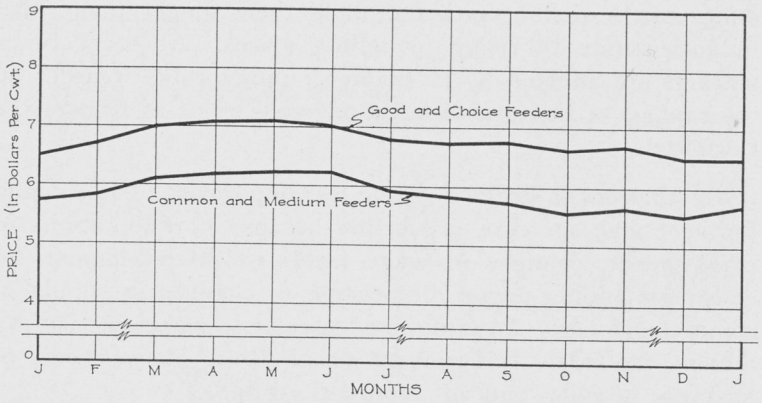

Fig. 3. Seasonal movement of prices of feeder steers at Omaha, 1929-1940.

SEASONAL CATTLE-PRICE MOVEMENTS

The average seasonal movements of four grades of fat cattle at Chicago are shown in fig. 2 and prices of feeders at Omaha in fig. 3. Each grade has a definite trend of its own. Grass-fat cattle and feeders from the ranges come to market in the largest numbers in the fall, and consequently their prices decline some 8 or 10 percent from June to December. On the other hand, the demand for thin cattle to utilize available pasture is strong in the spring when few are offered for sale. Consequently, thin cattle tend to be high from March to early summer. Prices of fat cattle follow a different trend. They decline during the spring and early summer with heavy runs of well-finished cattle.

Between these various seasonal price movements there are corresponding variations in the margin available between feeder prices and prices of fat cattle. This margin is one important source of returns on the feeding operation, and the feeder should be acquainted with its usual seasonal variation. Of course, the margin amounts to more on heavy cattle than on lighter weights or calves, but even on the latter it is a matter of importance.

The available margin varies widely from month to month (see fig. 4 and appendix table 2). Thus a farmer who buys

700-pound Medium grade feeders in April when feeders are high and sells them as Medium steers 6 months later in October would receive, on an average, a margin of $2 per hundred pounds or $14 per head (minus freight).[2] Cattle of similar weight and grade bought in October and sold in April would have yielded a margin of $2.60 per hundred pounds or $18.20 per head and would have been fed during the winter when there was less competition for the labor that they required.

There are also differences in margin between grades. Let us compare the available margins on Good to Choice feeders with those on the Medium feeders just mentioned. The Good to Choice feeders also bought weighing 700 pounds in April and sold in October as Good steers would have yielded an average margin of $12.60 per head, or $11.90 if bought in October and sold in April. But on the other hand, the Good

2 This is the gross and not the net margin; that is freight and other handling expenses have not been deducted between the Omaha feeder prices and the Chicago fat-cattle prices. These expenses, however, will be the same throughout the year (except for shrinkage in transit). Consequently the differences in margins from month to month or from one grade of cattle to another will be the same as in the illustrations quoted.

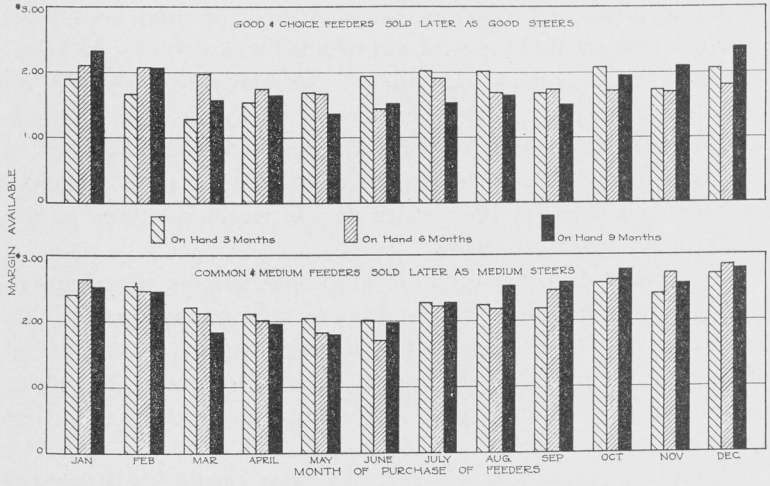

Fig. 4. Comparison of average margins received after 3, 6 and 9 months feeding period between Omaha prices for feeders and Chicago prices for fat cattle during the years, 1929-1940.

feeders would probably have offset part or all of the difference in margin by making more rapid gains.

The same grade of cattle may yield different margins when kept for various lengths of feeding periods. Thus, Good feeders weighing 900 pounds bought in March and later sold as Good steers may be expected to yield on an average margin of $1.30 per hundred pounds or about $11.70 per head if fed 3 months and sold in June. Similar cattle bought in March and fed 6 months would yield average margins of about $18 per head, while if fed 9 months they would return only $13.50 per head.

A prospective feeder should give careful consideration to these seasonal variations in margins as well as to his seasonal variations in feed and labor supplies.

COMPARISON OF FEEDING PRACTICES

Ordinarily a farmer has a fairly wide choice of practices in his feeding operations. First, he may choose the kinds and grade of cattle. He may decide to feed calves, yearlings or 2-year-olds. He may feed steers, heifers or cows. And any of these may be fed on pasture, in drylot with grain, silage and roughage, or in drylot with only grain and roughage. Each feeder wants specific information on the particular methods he is considering and is not likely to be much interested in others. Since there are so many possible methods and choices, however, it is necessary in a short bulletin such as this one to state the principal facts briefly for each principal method and then let the reader decide which sections of the bulletin he wants to read.

If a farmer has considerable land that can be best kept in grass, it may be advisable for him to feed on pasture. If he has relatively little pasture but a large supply of corn (and if corn prices are relatively low compared to cattle) it is more profitable to feed in drylot, assuming full feeding in either case.

Whatever method is selected, the most profitable length of feeding depends on relative prices of feeds and of fat cattle. The longer the cattle are kept on a full feed the more slowly

they gain. Consequently, there comes a time when the daily increase in value is no greater than the increase in cost. This is the point at which it is most profitable to stop feeding and sell the cattle. But to determine just when this should be done a close watch must be kept on the rate of gain, rate of feed consumption, price of cattle and price of corn. When corn is cheap and fat cattle are high, or when highly finished cattle bring a wide margin over thinner ones, it is profitable to keep them on feed longer than otherwise.

In the following pages we shall examine the effects of various feeding practices on costs of gains. But before doing this we should have in mind the general level of cost and the relative importance of the different cost elements. On approximately 400 lots of cattle fed in 1937-38 and 1938-39, the average total cost amounted to $8.53 per 100 pounds of gain.[3] This sum was made up as follows:

Feed and pasture	86 percent
Interest on investment in cattle and equipment	6 percent
Labor	3 percent
Depreciation and repairs (including buildings)	2.5 percent
Other costs	2.5 percent

Around 7 percent of the gross cost, however, was offset by credits for manure and for gain on hogs following the steers, leaving a net cost of $7.90.

DRYLOT COMPARED WITH PASTURE FEEDING

In recent years there has been a tendency to feed increasing numbers of cattle on pasture. Farmers with rough land often turn their feeders on grass partly to market the grass and partly to save corn. Further, if a farm has a large acreage of grass it generally has abundant dry roughage for winter feed also. Consequently, the cattle that are fattened on pasture generally receive large amounts of roughage throughout their stay on the farm.

[3] The cattle fed in drylot averaged about 600 pounds when bought, were on hand 7 months and gained 400 pounds per head. Those fed on pasture weighed 530 pounds when bought, were on hand 10 months and gained 530 pounds. Feed prices varied slightly as between the different feeding areas but were approximately 47 cents per bushel for corn, $4.50 per ton for silage, $12 per ton for alfalfa hay, $9 for clover hay and 50 to 75 cents per head per month for bluegrass pasture.

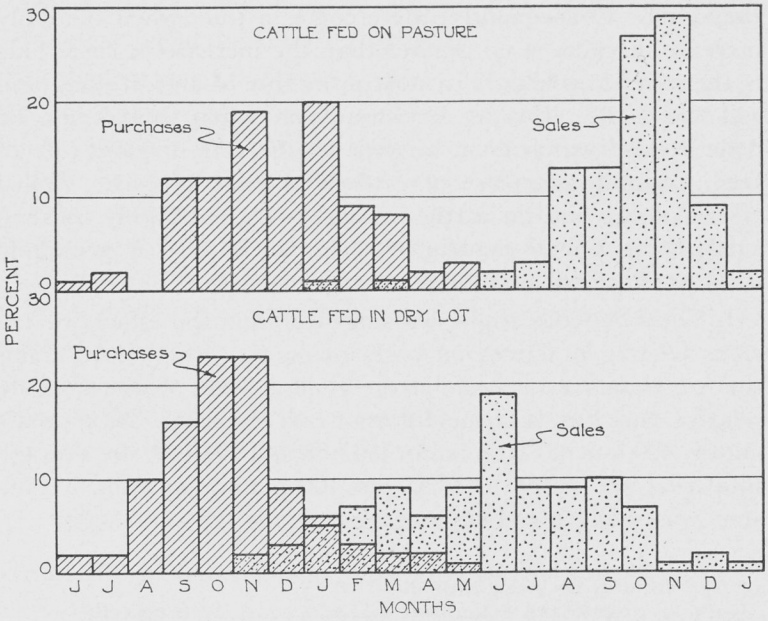

Fig. 5. Seasonal distribution of purchases and sales of cattle. Cattle to be fed on pasture may be bought any time from September to March and are sold from August to December, while cattle to be fed in drylot are generally purchased from August to December, but may be sold at any time from January to October.

The common practice is to buy light feeders or calves in the fall, carry them through the winter, largely on roughage, and then feed them on pasture during the following summer. This not only makes maximum use of roughage but also avoids the heavier initial investment that would be needed for heavier cattle.

Dates of purchase and sale of cattle differ decidedly between pasture-fed and drylot cattle (fig. 5). Those that are to be fed in drylot may be purchased in the fall any time from August to December. They may be fed for varying periods and sold at any time from March to October.

Pasture-fed cattle, on the other hand, are bought over a wider range of time—from September to March. If bought in the fall they are run on grass until frost or are used to graze the corn-stalk fields. During the winter they may be fed largely on roughage. In the spring they are turned on

pasture and are given increasing amounts of grain until the grass dries up in the late summer. After this they may be fed relatively more grain but continued on the pasture or may be finished in drylot and finally sold at any time from August to December.

On the farms studied, the pasture-fed cattle weighed on an average about 70 pounds less than the drylot cattle. Further, the pasture-fed cattle were on the farm 2 or 3 months longer than those fed in drylot. Also the lighter the cattle were at time of purchase the longer they were kept (fig. 6).

In general, feeding on pasture requires less grain and roughage both per day and per hundred pounds of gain than does drylot feeding. The cattle, however, gain somewhat less

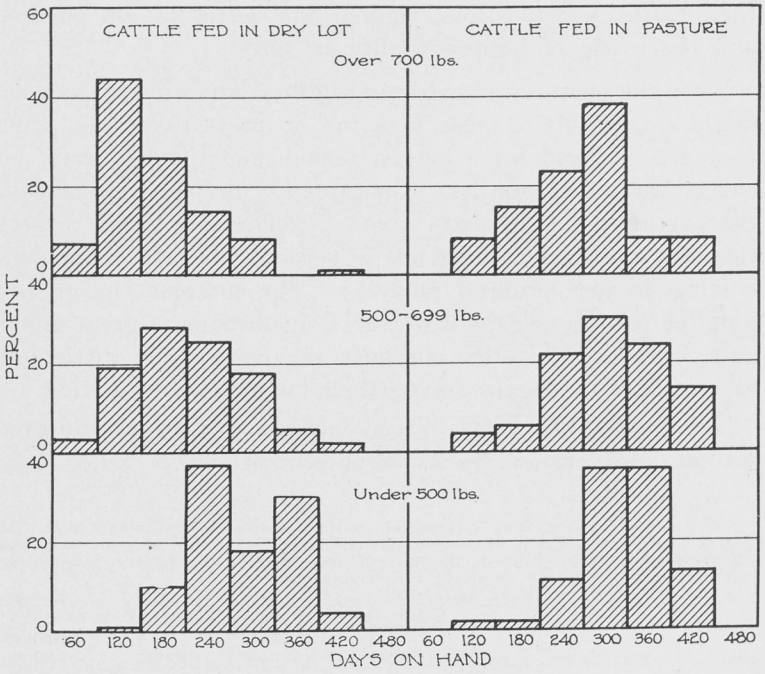

Fig. 6. Pasture-fed cattle are kept on the farm longer than those fed in drylot. Also, lighter cattle are kept longer than heavy feeders. Thus over 40 percent of the drylot cattle that weighed over 700 lbs. when bought were sold after about 4 months, while less than 20 percent of the 500- to 699-lb. drylot cattle were sold at 4 months, and only 1 percent of those with initial weights of under 500 lbs. were sold so soon.

rapidly. On the farms studied, comparable lots of steers gained at the rate of 1.7 pounds per day on pasture as against 1.8 pounds in drylot.[4] When this is taken into account there is no appreciable advantage in cost per hundred pounds of gain for the one system as compared to the other. Feed consumption per hundred pounds of gain under the two systems was as follows:

	On pasture	Drylot
Grain, bu. (corn equivalent)	12.4	12.9
Protein supplement, lbs.	34	32
Dry roughage, lbs.	187	178
Silage, lbs.	150	266
Pasture, days	27	11
Cost of feed and pasture	$7.19	$7.21

A number of the farmers followed the practice of dividing their cattle into two lots, feeding the better lot on pasture and the cattle of poorer quality in drylot.

Since the pasture-fed cattle are lighter when purchased, we might expect this to mean a saving in interest charges. But they are on hand for a longer period, and interest must be charged for more months. Consequently the total interest on the pasture-fed cattle was about 50 cents per head greater than for the drylot cattle (at 7 percent interest on feeders costing $8 per hundred pounds). The interest charge per hundred pounds of gain, however, is just about as great under one system as the other, because the pasture-fed cattle put on a greater total gain during their longer feeding period.

The farmer who wants to feed cattle on pasture should give careful consideration to his labor requirements. Since they

[4] Gain per day varied from 1.34 pounds to 3.61 pounds in drylot and from 1.18 to 2.95 on pastures. Partly because of this difference in the rate of gain, there was a corresponding range both in the cost of feed and in the total net costs per hundredweight of gain as shown by the following figures:

	Cattle fed in drylot		Cattle fed on pasture	
	Range	Standard deviation	Range	Standard deviation
Gain per day while on feed, lb.	1.34-3.61	0.42	1.18-2.95	0.26
Concentrates per cwt. gain while on feed, lb.	318-1340	204	385-1492	183
Feed cost per cwt. gain	$3.63-16.42	1.80	$4.68-17.01	1.99
Total net cost per cwt. gain*	$3.84-16.11	1.99	$5.31-24.20	3.31

*Including feed, labor and other expenses on the cattle while on the farm and minus manure credit and pork credit.

are kept longer, pasture-fed cattle require somewhat more total labor than those fed in drylot. Even more important, however, a large part of this labor must be used on the cattle during the busy summer months when it is likely to be needed on crops.

WEIGHT OF FEEDERS AND LENGTH OF FEEDING PERIOD

The longer the cattle are full fed the less rapid becomes the gain and the higher the cost per 100 pounds of added weight. At the same time, as the cattle improve in finish their value per pound increases. To make the greatest profit the cattle feeder will try to balance the increased cost of a longer feed against the increased value of the cattle. If the spread in price between Medium and Good, or Good and Choice cattle increases, he will profit by feeding somewhat longer than he had originally planned. If the spread becomes narrower, he will want to feed for a shorter period.

This general principle of variation in cost is borne out by comparisons between lots of cattle that were fed for different periods of time. With steers that weighed 700 pounds or over when put on feed, gains and feed costs varied as follows:

	Under 120 days	120 to 209 days	210 to 299 days
Gain per head per day, lbs.	2.67	1.87	1.78
Feed per hundred pounds of gain			
Grain, bu. (corn equivalent)	11.0	15.1	15.3
Protein supplement, lbs.	32	43	66
Dry roughage, lbs.	134	319	209
Silage, lbs.	613	381	547
Feed value per cwt. gain	$ 7.08	$ 8.01	$ 8.60
Total cost per cwt. gain	7.54	8.64	9.35

The number of lots of similar cattle, handled by comparable methods was small, but the trends of costs are clearly evident.[5] When thin, heavy cattle are put on feed, at first they go through a "filling up" process for a short time, making very rapid gains. Consequently the cattle fed less than 120 days made very rapid gains at low feed consumption per 100

[5] In this comparison there were 19 lots of cattle that were fed less than 120 days, 35 lots fed 120 to 209 days, and 11 lots fed 210 to 299 days. Amounts of pasture received by these three groups were negligable. Other comparisons may be made in appendix table 3.

pounds of gain. Following this, gains became less rapid, and costs of gain increased. Thus gains on the cattle fed 4 to 7 months cost about a dollar per hundred pounds more than on those fed less than 4 months. On the steers fed 7 to 10 months the average cost of gain was higher still by about 60 cents. By far the greater part of the difference is to be explained by variations in feed cost.

The farmer who wants to make the maximum profit must be careful that he does not feed past the point where costs for the gain become greater than the increase in value of the steers.

What does the gain in weight at the end of the feeding period cost? If we assume that the long-fed cattle put on their first gains at the same costs as the short-fed ones,[6] then the last 140 pounds of weight put on the 700-pound steers that were fed 7 to 10 months cost about $9.90 per hundred pounds. This may be compared with a feed cost of $8.01 per hundred pounds for steers of the same initial weight that had been fed 4 to 7 months.

Let us see how it works with steers weighing 500 to 699 pounds when put on feed. In this weight-class (using the same method of estimate) the gains from the seventh to the tenth month are estimated to cost $8.50 per hundred pounds. The lighter steers were sold at average weights of 1,060 pounds compared with 1,200 pounds for the heavier ones. The difference in feed cost of the last hundred pounds between these two weight classes is about $1.50.

Thus the costs of gains differ between weight classes as well as between lots of the same weight that are fed for different periods of time. The same principle of increasing costs applies in each case. Indeed the heavier cattle are simply ones that have previously gone through the earlier stages of growth.

Comparisons in feed costs between three groups of steers of different initial weights, all of which were fed from 7 to 10 months, are as follows:

[6] This assumption probably does not hold exactly. The short-fed cattle are likely to be pushed along more rapidly from the start than are the long-fed ones.

	Under 500 lbs.	500 to 699 lbs.	700 lbs. and up
Gain per head per day, lbs.	1.76	1.78	1.78
Feed per hundred pounds of gain			
Grain, bu. (corn equivalent)	12.5	16.4	15.3
Protein supplement, lbs.	10	55	66
Dry roughage, lbs.	218	229	209
Silage, lbs.	332	94	547
Value of feed per cwt. gain	$ 6.72	$7.90	$ 8.60
Total cost per cwt. gain	7.49	8.54	9.35

In this comparison the 500- to 699-pound feeders received more corn but less silage than either of the other two lots.[7] If we count the corn that was contained in the silage in each case; the lightest cattle used 13.6 bushels of corn or its equivalent per hundred pounds of gain, the medium weights received 16.7 and the heaviest steers used 17.1 bushels.

VARIATIONS IN AMOUNT OF ROUGHAGE IN THE RATION

Under the programs of the Agricultural Adjustment Administration many farmers find themselves with increased amounts of roughage to feed. How much of this can be fed to fattening cattle, and how will it affect the cost of gains? At recent prices of grain and roughage, costs and returns vary but little if we may judge from 33 lots of cattle fed large amounts of roughage as compared with an equal number fed more heavily on grain.[8] The results are as follows:

	High-roughage rations	Low-roughage rations
Pounds grain fed per pound of roughage	2.0	6.4
Average gain per day on feed, lbs.	1.87	1.79
Feed per hundred pounds of gain		
Grain, bu. (corn equivalent)	14.2	17.1
Protein supplement, lbs.	42	35
Dry roughage, lbs.	395	150
Value feed and pasture per cwt. gain	$ 7.21	$ 7.43
Total cost per cwt. gain	8.15	8.16

[7] In this comparison there were 10 lots of steers in the lighter class, 22 in the medium and 11 in the heaviest weight class. The lightest steers received an average of about 10 days more pasture per hundred pounds of gain than did the heavier classes.

[8] These lots of cattle were selected so that there was an equal number from each weight group and from each group of cattle as classified on length of feeding period. Also silage-fed and pasture-fed lots were omitted in order to obtain a clear-cut comparison between the high- and low-roughage rations.

The high-roughage lots saved 3 bushels of corn per hundred pounds of gain but used 245 pounds more roughage. The feed cost per hundred pounds of gain was slightly less with the high-roughage ration, but labor and other costs were somewhat higher, so that total cost per hundred pounds was the same on the low- as the high-roughage cattle. The cattle fed more grain graded somewhat better when they were sold and brought 40 cents more per hundred pounds.

But there is a wide difference in the feeding value of various types of roughage. Would these results apply equally if the cattle were fed alfalfa or mixed clover and timothy hay? To get some light on this question the high-roughage cattle just discussed were subdivided into two groups, one of which was fed chiefly on legume roughage such as alfalfa and the other on non-legume roughage.

This time the comparisons are more striking. There is more difference between results of feeding legume and non-legume roughage than between the low-roughage ration and the high-roughage group in which all kinds of roughages are combined:

	High legume roughage rations	High non-legume roughage rations
Feed per hundreds pounds of gain		
Grain, bu. (corn equivalent)	13.4	15.4
Protein supplement, lbs.	34	49
Dry roughage, lbs.	331	486
Pasture, days	0	9
Value feed and pasture per cwt. gain	$ 6.65	$ 7.87
Total cost per cwt. gain	7.65	8.76

Where alfalfa or similar legume hay was fed there was a saving of a bushel of corn and also of 155 pounds of dry roughage per hundred pounds of gain as compared with the cattle fed chiefly on non-legume roughage. Further, feed cost and total cost per hundred pounds were each lower by about a dollar than with the non-legume roughage even though alfalfa was valued at $12 per ton as compared to $9 for mixed hay.

The conclusion is that the type of roughage fed makes more difference in the gain and value of gain than does the proportion between roughage and grain, at least within reasonable limits.

The price of corn as compared with that of hay makes fully as much difference in the net returns as does the proportion between grain and roughage. The cattle that were fed the low-roughage rations received some alfalfa and some non-legume roughage, and the high- and low-legume rations each contained some small amount of the opposite types of roughage. Consequently the comparisons are not entirely clear cut. Nevertheless, the differences in costs stand out pretty definitely.

If corn were 50 cents per bushel, mixed hay $9 per ton and legume hay $12, the cattle fed the ration that was high in legume hay would have an advantage over the high-grain ration of about 70 cents per hundred pounds of gain and an advantage over those fed the low-legume ration of $1.60.[9]

If corn were to go to $1 per bushel and roughage prices remain where they were, the advantage of using legume roughage would become much greater. At these prices the high-legume rations would produce 100 pounds of gain at a feed cost $2.50 below either of the other two combinations.

VARIATIONS IN THE PROTEIN CONTENT OF THE RATION

Does it pay to feed heavily on protein supplements? Cottonseed meal, linseed meal and soybean meal all cost more per ton than does grain. Consequently many farmers have a tendency to use them very sparingly. Is this good economy?

Sixty-one farms using relatively small amounts of protein supplement were compared to an equal number feeding supplements more freely. These two groups were matched as to grade of feeder cattle, purchase weight and length of time the cattle were on the farm. Results were as follows:

	Low protein	High protein
Pounds gain per day per head	1.86	1.91
Feed per hundred pounds of gain		
Grain, bu. (corn equivalent)	13.6	12.2
Protein supplement, lbs.	19	46
Silage, lbs.	292	223
Dry roughage, lbs.	152	230
Feed and pasture value	$ 7.33	$ 7.32
Comparative sale price	10.74	10.97

[9] Counting the low-legume roughage as ¼ legume hay and three-fourths non-legume and the high-legume rations as three-fourths legume and ¼ non-legume roughage.

The high-protein cattle used an average of 27 pounds more supplements per hundred pounds of gain. They were also fed more dry roughage. But they consumed 1.3 bushels less corn per hundred pounds of gain. The value of the corn saved was just about as great as the value of the additional supplement. The average value of feed and pasture per hundred pounds of gain was almost exactly equal for the two groups of cattle. Had the price of corn been greater than the price of 20 pounds of protein supplement, however, there would have been a definite saving in the feed cost per hundred pounds of gain.

Even in this case there was some advantage. The high-protein cattle were apparently in somewhat better finish when sold and brought about 20 cents per hundred pounds more than the ones fed less supplement.

In 1938 and 1939, when these cattle were fed, protein supplements were unusually high priced as compared with corn. This is probably the reason for the relatively small amounts of supplement fed. The advantage in sales price of the high-protein cattle suggests that the reduction was probably poor economy.

SILAGE FEEDING

Does it pay to feed silage to fattening steers? Many feeders have argued on this question. If we may judge from a comparison of 33 lots of silage-fed steers with 42 similar lots that were fed no silage, the costs ran somewhat higher where silage was used.

The silage-fed steers were not fed on it very heavily. Most of them received from ½ to 1½ tons, usually early in the feeding period. On an average they were given 818 pounds of silage per hundred pounds of gain. They received 50 pounds less dry roughage and 1.3 bushels less grain than the steers that were fed no silage. If we include the corn contained in the silage, however, the silage-fed steers received nearly a bushel more corn equivalent than did the non-silage lots. Feeds and costs to the two groups of feeders may be summarized as follows:

	Silage fed	No silage
Gain per day on farm, lbs.	1.87	2.01
Feed per hundred pounds of gain		
Grain, bu. (corn equivalent)	12.6	13.9
Protein supplement, lbs.	37	35
Silage, lbs.	818	0
Dry roughage, lbs.	187	220
Feed value, 1938-39 prices	$ 7.99	$ 7.48

While costs of feed per hundred pounds of gain were about 50 cents higher on the silage-fed cattle, the comparative sales prices averaged nearly the same or very slightly in favor of the silage-fed steers.

According to these figures, with corn at 47 cents per bushel as in 1938-39, silage would have to be valued at slightly less than $4 per ton to make it profitable to feed it to steers.

HEAVY COMPARED TO LIGHT FEEDING

Some cattle feeders prefer to bring cattle up to a full feed slowly or to feed somewhat less than the cattle will clean up throughout the feeding period, while others try to get them on full feed as quickly as possible. How do these different levels of feeding affect the rate of gain and the feed and pasture cost?

Comparisons of three groups of 33 to 36 lots of cattle fed varying amounts per day while on feed show that the heavily fed cattle gained about a third of a pound per day more than did those fed most lightly. The heavily fed cattle, however, received about a third more feed per day, and the cost per hundred pounds of gain was considerably higher. The difference in results while the cattle were on feed was chiefly in the amount of grain fed. This is shown by the following figures:

	Light feed	Medium feed	Heavy feed
Gain per head per day, lbs.	1.94	2.09	2.24
Feed per hundred pounds of gain			
Grain, bu. (corn equivalent)	12.4	14.4	16.2
Protein supplements, lbs.	39	40	38
Silage, lbs.	403	519	453
Dry roughage, lbs.	204	204	250
Feed value, 1938-39 prices	$7.27	$8.06	$8.90

Heavy steers responded better to heavy feeding than did lighter cattle. Among the steers weighing over 700 pounds

when put on feed, those receiving the heaviest daily rations gained four-tenths of a pound per day more than the lightest fed steers of similar weight.[10]

Although the heavy daily rations led to higher costs per hundred pounds of gain, casual observation suggests that the heavily fed cattle were in somewhat higher finish when sold, and at least a part of the higher cost was probably offset by higher sales price. The cattle fed most heavily were, however, on feed for a slightly shorter period than those fed less heavily. This had some influence on the results, though not enough to change them very much.

FEED COSTS IN FATTENING HEIFERS

How does the cost of fattening heifers compare with that of steers? Data on 39 lots of heifers give an idea what results farmers might reasonably expect. Included are 20 lots of heifer calves averaging 382 pounds when bought and 19 lots of heifers weighing between 500 and 700 pounds, with an average of 584 pounds.

Heifers fatten more quickly than steers and consequently are sold after a much shorter feed and at lighter weights. The heifer calves were fed slightly over 6 months as compared with nearly 10 months for steers of similar weight. The heavier heifers were fed an average of only 3½ months. The feed costs per hundred pounds of gain are shown below:

	Under 500 pounds	500 to 700 pounds
Gain per day on farm, lbs.	1.66	1.92
Feed per hundred pounds of gain		
Grain, bu. (corn equivalent)	12.2	11.5
Protein supplement, lbs.	17	48
Silage, lbs.	201	292
Dry roughage, lbs.	202	195
Pasture, days	10	13
Feed and pasture value, 1938-39 prices	$ 6.53	$ 7.05

[10] The lots of cattle compared were selected by taking lots of steers that were fed in drylot in the weight classes 500 to 699 lbs., and 700 pounds and up, and dividing into three equal groups on the basis of pounds of digestible nutrients fed per head per day. Average total digestible nutrients per head per day were 14.2 lbs. for the lightest fed, 17.6 lbs. for medium fed and 20.9 lbs. for heavily fed lots. Average number of days on feed were 175 for the light fed, 167 days for the medium fed and 158 days for the heavily fed lots.

The heavier heifers used slightly less grain per hundred pounds of gain than did the calves but were fed much more heavily on protein supplement. Consequently the total value of feed and pasture per hundred pounds of gain was about 50 cents higher on the heavier heifers. Costs of gains do not differ greatly from costs on steers of corresponding weights which were fed equal lengths of time.

APPENDIX TABLE I. ORGANIZATION OF COMMERCIAL CATTLE-FEEDING FARMS—1938[a]

Number of cattle fed	Under 50		50 or more		State average
Method of feeding	drylot	pasture	drylot	pasture	.....
Number of farms	28	24	18	17	.....
Average acres per farm	259	210	258	317	164[b]
Percent of land in corn	43	38	39	39	30[b]
Small grain	24	23	25	21	20[b]
Hay and pasture	27	33	29	35	39[b]
Feeds purchased					
Corn, bu.	496	1091	3735	4240	.....
Oats, bu.	402	201	719	584	.....
Comm'l. feeds, tons	3.8	4.9	13.0	22.0	.....
No. cattle sold or butchered	29	23	100	79	.....
No. hogs sold or butchered	83	98	103	136	.....
Labor hired, months	8.1	6.8	10.9	12.8	.....
Labor, all, months	25.4	20.4	24.6	27.5	.....
Investment, all equipment[c]	$2531	2048	1951	2863	1173
Cattle-feeding equip.[c]	$ 74	57	138	94	.....
Investment, permanent improvements[c]	$3559	3162	3961	4802	4450

[a] On cattle-feeding farms from which survey records were obtained for the 1938-39 feeding period.

[b] Based on Iowa Yearbook of Agriculture, 1938.

[c] On farms reporting.

APPENDIX TABLE II. AVAILABLE MARGINS PER HUNDRED POUNDS BETWEEN OMAHA FEEDER CATTLE AND CHICAGO FAT CATTLE PRICES AFTER INDICATED NUMBER OF MONTHS ON HAND, 1929-1940 AVERAGE

Month of purchase	"Good and choice" feeders sold later as "Good" steers			"Common and medium" feeders sold later as "Medium" steers		
	Sold 3 Mo. later	Sold 6 Mo. later	Sold 9 Mo. later	Sold 3 Mo. later	Sold 6 Mo. later	Sold 9 Mo. later
Jan.	$1.90	$2.10	$2.30	$2.50	$2.60	$2.50
Feb.	1.60	2.10	2.10	2.50	2.50	2.20
Mar.	1.30	2.00	1.50	2.20	2.10	1.80
Apr.	1.50	1.80	1.60	2.10	2.00	2.00
May	1.70	1.70	1.40	2.00	1.80	1.80
June	2.00	1.40	1.50	2.00	1.70	2.00
July	2.00	1.90	1.50	2.30	2.20	2.30
Aug.	2.00	1.70	1.60	2.20	2.20	2.50
Sept.	1.70	1.80	1.50	2.20	2.40	2.60
Oct.	2.10	1.70	2.00	2.60	2.60	2.80
Nov.	1.70	1.70	2.10	2.40	2.70	2.60
Dec.	2.00	1.80	2.50	2.70	2.80	2.80

APPENDIX TABLE III. VARIATION IN AMOUNTS OF FEEDS USED AND IN COSTS ON STEERS FED IN DRYLOT. COMPARISONS OF RESULTS WITH VARIOUS LENGTHS OF FEEDING PERIOD AND INITIAL WEIGHTS OF FEEDERS.

	Initial weight under 500 pounds		Initial weight 500 to 699 pounds		Initial weight 700 pounds or more		
	Fed 210 to 299 days	Fed 300 to 389 days	Fed 120 to 209 days	Fed 210 to 299 days	Fed less than 120 days	Fed 120 to 209 days	Fed 210 to 299 days
Number of lots of cattle	10	16	24	22	19	35	11
Number per lot	32	52	34	48	45	45	52
Weight when put on feed, lbs.	440	374	635	595	862	769	768
Days on feed	259	344	166	260	101	157	244
Gain per head per day, lbs.	1.76	1.70	2.08	1.78	2.67	1.87	1.78
Feed per hundred pounds gain							
Grain, bu. (corn equivalent)	12.5	13.8	14.1	16.4	11.0	15.1	15.3
Protein supplement, lbs.	10	38	24	55	32	43	66
Dry roughage, lbs.	218	176	195	229	134	319	209
Silage, lbs.	332	59	525	94	613	381	547
Pasture, days	12	7	3	4	1	5	2
Value feed and pasture per hundred pounds gain (1938-39 prices)	$6.72	$7.19	$7.65	$7.90	$7.08	$8.01	$8.60
Total cost per hundred lbs. gain	$7.49	$7.79	$8.25	$8.54	$7.54	$8.64	$9.35